skin lesions and even altered mental state, may be due to *C immitis,* a potentially treatable agent. Diagnosis should be aggressively pursued, both serologically and histologically, if the probability of a therapeutic response is to be maximized. All AIDS patients should be questioned about travel to endemic areas or any history of coccidioidomycosis, including skin testing. Lymph node involvement occurs frequently with coccidioidomycosis, as well; a lymph node biopsy should therefore be part of the work-up in patients suspected to have AIDS.[14,15] Because the most frequent sites of dissemination include skin, bone, meninges and the genitourinary system, appropriate cultures should be done. If there is any sign of dissemination, including reversals of a previously positive skin test or a rising titer, aggressive therapy with amphotericin B should be considered.


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# Peritonsillar Abscess Associated With *Corynebacterium hemolyticum*


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*Corynebacterium hemolyticum* is a biochemically and clinically distinct species that has been increasingly recognized as a significant human pathogen. The first report of human infection by MacLean and co-workers[1] included more than 150 isolates, predominantly from the nasopharynx and skin. Subsequent reports[2-6] have confirmed the association with pharyngitis, often accompanied by a scarlatiniform rash, in young adults. In addition, there have been case reports of *C hemolyticum* isolated from brain abscesses,[7,8] blood,[9] osteomyelitis[10] and cutaneous abscesses, ulcers and paronychia.[1,4,5,10]

*C hemolyticum* involvement in the local suppurative complications of pharyngitis and tonsillitis has not been previously documented. We report three cases of peritonsillar abscess associated with *C hemolyticum.*

## Reports of Cases

CASE 1. The patient, a 21-year-old college student, had been in good health with the exception of recurrent sore throats occurring several times per year. Approximately ten days before admission, a sore throat, predominantly on the left side, developed without associated symptoms. The soreness waxed and waned over the ensuing week until three days before admission when it increased greatly and odynophagia developed. Two days before admission he presented to the student health center where a Gram's stain from a tonsillar swab showed many leukocytes and mixed bacteria with a predominance of Gram-positive rods. Some hemolysis was noted on the culture, but the plate was too overgrown for specific identification to be made. His symptoms worsened and on a return visit to the health center penicillin VK, 500 mg four times a day, was prescribed. Over the subsequent 24 hours his condition continued to deteriorate and he was transferred to the hospital. On admission his symptoms included sore throat on the left side, dysphagia, odynophagia, trismus and voice changes. Physical examination revealed a bulging, swollen left tonsil and a temperature of 38°C (100.4°F). No rash was present. Results of initial laboratory studies were unremarkable except for a peripheral leukocyte count of 12,200 per cu mm with 78% neutrophils; no immature forms or atypical lymphocytes were noted. A Monospot test was negative.

He was placed on a regimen of intravenously given penicillin G, 1 million units every six hours, and was taken to the operating room the following morning after receiving three doses. Approximately 1 ml of pus was aspirated from the left peritonsillar area and a tonsillectomy carried out without complication. Gram's stain of the aspirate contained 4+ leukocytes and 3+ Gram-positive rods. The material was cultured both aerobically and anaerobically and yielded a pure growth of *C hemolyticum* sensitive to penicillin, ampicillin, tetracycline, erythromycin, clindamycin, vancomycin and cephalothin. Recovery was uneventful after intravenous administration of penicillin for one day fol-


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lowed by penicillin VK, 250 mg by mouth four times a day for ten days.

CASE 2. The patient was a 14-year-old adolescent girl with an unremarkable past medical history. Seven days before admission, a sore throat developed and she had fever to 40°C (104°F) for which she received a brief course of an unknown antibiotic without response. There was no history of other upper respiratory tract symptoms. Her presentation to the hospital was precipitated by the progressive development of throat pain, dysphagia and trismus, particularly on the right. On initial examination the patient's temperature was 38°C. There were bilateral, fluctuant peritonsillar masses. There was no skin rash. The admission peripheral leukocyte count was 15,600 per cu mm with 81% neutrophils and 6% band forms. A Monospot test was negative.

She was treated with penicillin G, 1 million units given intravenously every four hours, and received four doses before operation the following morning. Bilateral peritonsillar abscesses were found at operation: 15 ml of purulent material was drained from the right side and 5 ml from the left. Aspirated material was sent for aerobic and anaerobic cultures. Gram's stain of the pus showed abundant polymorphonuclear leukocytes, abundant Gram-positive rods, and few Gram-negative rods. Abundant *C hemolyticum,* sensitive to penicillin, cephalothin and erythromycin, was isolated on culture, along with scant growth of an α-hemolytic streptococcus from the broth culture only. The patient remained in hospital and received penicillin G intravenously for three days and was then discharged to receive penicillin VK, 250 mg four times a day. Recovery was uneventful.

CASE 3. The patient, a 16-year-old girl, was previously in good health except for a long history of frequent sore throats. Three and a half weeks before admission, instances of sore throat began. On examination there was mild pharyngeal injection but no fever. Throat culture yielded only mixed flora. Four days later she returned with persistent sore throat now accompanied by fatigue and nasal discharge. Findings on physical examination were unchanged. A Monospot test was negative and repeat throat culture yielded mixed flora with moderate amounts of *C hemolyticum.*

The sore throat waxed and waned over the next three weeks until the morning of admission when it abruptly worsened. She was unable to eat solids and could swallow liquids only with pain. On physical examination she was afebrile but had a bulging left tonsil felt to be clinically consistent with a peritonsillar abscess. No rash was noted. Her leukocyte count was 16,300 per cu mm with 85% polymorphonuclear leukocytes and 2% bands. Culture of a swab of the left tonsil yielded predominant growth of *C hemolyticum.* The tonsillar mass was aspirated under local anesthesia and a scant amount of purulent material was obtained which was not sent for culture. She was treated in the hospital for one day with penicillin G, 1 million units intravenously every four hours, then discharged to receive penicillin by mouth for two weeks, 250 mg four times a day. She returned two weeks later for tonsillectomy.

## Microbiology

Tests employed for speciation of *C hemolyticum.* were essentially those suggested by Hermann.[11] These consisted of fermentation of the following sugars: glucose, maltose, sucrose and lactose; nitrate reduction test; indol test; catalase test; hydrogen sulfide production (triple sugar-iron agar slants and saturated lead acetate strips); rapid urease test, and gelatin liquefaction.

In addition hemolytic activity on 5% human blood agar and growth on serum tellurite plates were documented.

## Comments

*Corynebacterium hemolyticum* is a Gram-positive bacillus closely resembling *Corynebacterium pyogenes,* being differentiated primarily by its lack of gelatin hydrolysis. *C hemolyticum* and *C pyogenes* are unique among the Corynebacteria in being catalase-negative, which had suggested to early investigators a possible taxonomic relationship with the streptococci.[12] Subsequently, however, the guanine-cytosine content of the *C hemolyticum* genome was shown to be quite distinct from that of streptococci.[13] The most recent proposal has been to reclassify *C hemolyticum* as *Arcanobacterium hemolyticum,* the sole member of a new genus tentatively placed within the coryneform group of bacteria.[14] As this new nomenclature has not been formally approved, we have retained the established usage of *Corynebacterium hemolyticum* for the present report.

*C hemolyticum* was first implicated as a human pathogen in 1946 by MacLean and co-workers, who reported 150 isolates from throat infections and skin lesions in the Pacific Theater during World War II.[1] Cutaneous injection into rabbits and guinea pigs produced local inflammation and abscess formation, but the researchers were unable to reproduce the throat disease in human volunteers. No case of peritonsillar abscess was noted among 12 patients with acute tonsillitis.

No further clinical reports appeared over the following decade. In 1960 Gartner and Knothe[2] confirmed the association of *C hemolyticum* with pharyngitis and noted the frequent occurrence of scarlatiniform rash in these patients. The following year Hermann reported eight isolates of *C hemolyticum* submitted to the Centers for Disease Control over the two-year period 1958 and 1959.[11] No clinical information was available on these cases other than that five of the eight were throat isolates, while three were from ear, blood and leg lesion specimens.

In 1972 Ryan[3] reported two cases of membranous pharyngitis associated with a scarlatiniform rash in which cultures yielded heavy growth of *C hemolyticum.* The largest recent series is from Cambridge,

England, where Fell reported 137 pharyngeal infections in patients aged 15 to 25 years.[4] Most of these patients had sore throats and 65 had an "irritant" maculopapular rash. Two recent reports emphasize other aspects of *C hemolyticum* infections: Wickremesinghe reported 16 cases from Sri Lanka and noted the rarity with which *C hemolyticum* is isolated in pure culture—a feature shared with other species of *Corynebacterium*[5]; and Green reported a single case of pharyngitis associated with a greyish-yellow membrane mimicking pharyngeal diphtheria.[6]

The three cases described here are consistent with the reported experience in several ways. Although none of the patients had a skin rash, all fell within the 15- to 25-year-old age group, which appears to be at greatest risk for *C hemolyticum* infection. All three had initial symptoms of nonspecific tonsillitis and pharyngitis, and all eventually responded to penicillin in combination with drainage. Leukocytosis, reported to be uncommon in uncomplicated pharyngitis, was present in all of our patients. However, despite the frequent association of *C hemolyticum* with pharyngeal infection, the organism has not previously been implicated in the local suppurative complications of acute mucosal infection of the oral cavity. In past series[15,16] of the microbial flora of peritonsillar abscesses, *Streptococcus* sp (alpha and beta hemolytic) have been the most common isolates, with *Bacteroides* sp the next most frequent. *Staphylococcus aureus, Hemophilus influenzae, Klebsiella pneumoniae* and *Streptococcus pneumoniae* were found in rare instances as well. No isolate of any species of *Corynebacterium* has been reported.

This report further substantiates the pathogenic potential of *C hemolyticum* in health, young adult hosts. Sepsis with this organism has been described and the present study provides evidence of local invasiveness. Awareness of the pathogenicity of *C hemolyticum* and the use of appropriate media to optimally demonstrate the characteristic $\beta$-hemolysis (for example, rabbit or human blood agar) will facilitate identification of these bacteria in oropharyngeal infections. Fortunately the strains described in the literature and those seen in our patients have been uniformly sensitive to the antibiotics commonly used for bacterial tonsillitis. The major concern is that use of sheep-blood containing agar media on which hemolysis is minimal and delayed may lead to an incorrect diagnosis of viral pharyngitis with the result that antibiotic therapy is withheld. This may lead to progressive and invasive infection such as that observed in these three cases.

## Addendum

One additional case of peritonsillar abscess associated with *C hemolyticum* was reported after the preparation of this manuscript.[17]

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# Multiple Synchronous Lesions of Acral Metastasis


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METASTASIS to the hands and feet (acral metastasis) is rare. Recognition of such lesions as metastatic is often difficult and a degree of clinical suspicion is required. These lesions almost inevitably foretell an ominous prognosis. One small subgroup of these patients has multiple synchronous acral metastatic lesions, rather than single lesions. Not only is their prognosis poor but, due to their unusual presentation, the lesions may be even less likely to be recognized for what they are and other disorders, including osteomyelitis or cardiac embolic phenomena, may be considered and evaluated first. We report a case of multiple synchronous acral metastatic lesions in a patient who had lung cancer.

## Report of a Case

The patient, a 63-year-old man, had had a left upper lobectomy for poorly differentiated squamous cell carcinoma of the lung seven years before the present admission. Liver-spleen scan, brain scan and bone scan


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